

homopolymerization of the diallyl phthalate-based monomer, the known polymerization reaction described, for example, in JP-B-35-16035 can be conducted. In order to obtain the diallylphthalate-based prepolymer by copolymerization of the diallylphthalate-based monomer, as the main component, with another monomer copolymerizable with the diallyl phthalate-based monomer, the known polymerization reaction described, for example, in Kogyo Kagaku Zasshi, vol. 70(3), p. 360 to 364 (1967) can be conducted.

In general, the copolymer mainly comprises a diallylphthalate constitutional unit.

As the allyl-based prepolymer (A) used in the invention, a homopolymer, such as a diallylorthophthalate prepolymer, e.g., "Daiso DAP" produced by Daiso Co., Ltd., a diallylisophthalate prepolymer, e.g., "ISO DAP" produced by Daiso Co., Ltd., and a diallyltetraphthalate prepolymer are preferred. The diallyltetraphthalate prepolymer can be, for example, a modified product thereof, e.g., "Daplen" produced by Daiso Co., Ltd. or "TAIC Prepolymer" produced by Nippon Kasei Chemical Co., Ltd. There can also be used the terpolymer of epichlorohydrin, ethylene oxide and allyl glycidyl ether, e.g., "Epichlomer CG Series" produced by Daiso Co., Ltd., the terpolymer of diethylene glycol glycidyl methyl ether, ethylene oxide and allyl glycidyl ether, the terpolymer of 2-[1, 3-bis(2-methoxyethoxyethoxy)propyl glycidyl ether, ethylene oxide and allyl glycidyl ether (see JP-A-11-269263 and JP-A-11-345628), and the like.

Furthermore, the allyl-based prepolymer (A) can be an organic-inorganic complex transparent uniform material, which is a metallic

oxide polymer obtained through dehydration condensation by a sol-gel method, for example, of a metallic alkoxide having a metallic atom, a group having an aromatic ring, and a hydrolyzable group as shown by the general formula below in the presence of a diallyl phthalate-based monomer and/or a diallyl phthalate-based polymer (see WO 99/14274).

The metallic alkoxide is a substance represented by the general formula:



wherein X represents an alkoxy group represented by the general formula $R^1 O$ (wherein R^1 represents a monovalent organic group); M represents a metallic atom selected from the group consisting of silicon, titanium, zirconium, germanium and aluminum; Ar represents a group having an aromatic ring; R^2 represents a monovalent organic group; m and n are a number of 1 or more; and p is a number of 0 or more, provided that $m + n + p$ is the valence number of the metallic atom represented by M.

Specific examples of a metallic alkoxide having a tetravalent metallic atom (e.g., Si, Ti, Zr and Ge) include the following; $(CH_3O)_3MPh$, $(C_2H_5O)_3M(CH_2Ph)$, $(C_2H_3O)_3M(C_2H_4OPh)$, $(C_3H_8NO)_3MPh$, $(C_4H_9O)_3M(C_3H_4Ph)$, $(CH_4NO)_2MPh_2$, $(C_2H_5O)_2M(CH_3MPh)_2$, $(C_3H_5O)_2M(C_4H_8Ph)_2$, $(C_4H_{10}NO)_2M(C_2H_2O_2Ph)_2$, $(CH_3O)_2M(C_4H_9NPh)(C_4H_9)$, $(C_2H_5O)_2M(C_4H_6O_2Ph)(C_3H_5)$, $(C_2H_3O)_2M(C_2H_4Ph)(C_2H_5O)$, $(C_3H_8NO)_2M(CH_2Ph)(CH_4N)$, $(C_4H_9O)_2MPh(CH_3)$, $(CH_4NO)_2MPh(C_2H_5)$, $(C_2H_5O)_2M(CH_2Ph)(C_3H_7O)$, $(C_3H_5O)_2M(C_2H_2Ph)(C_5H_9O_2)$, $(C_4H_{10}NO)_2MPh(C_4H_{10}N)$, $(CH_3O)_2M(CH_2OPh)(C_3H_7)$, $(C_2H_5O)_2M(C_5H_8O_2Ph)(C_4H_9)$,

(C₂H₃O)₂MPh(C₃H₈N), (C₃H₈NO)₂M(C₂H₄Ph)(C₂H₅), (C₄H₉O)₂MPh(C₂H₃O₂), (CH₄NO)₂MPh(C₃H₇), (C₂H₅O)₂M(CH₃NPh)(C₃H₅O₂), (C₃H₅O)₂M(C₄H₈Ph)(C₂H₃) and (C₄H₁₀NO)₂M(C₂H₂O₂Ph)(CH₃).

Preferred examples of metallic alkoxide are phenylalkoxysilane such as (CH₃O)₃MPh, (C₂H₅O)₃MPh, (C₃H₇O)₃MPh, (C₄H₉O)₃MPh, (CH₃O)₂MPh₂, (C₂H₅O)₂MPh₂, (C₃H₇O)₂MPh₂ or (C₄H₉O)₂MPh₂ and phenyltrimethoxysilane is the most preferable among them.

Preferred examples of Aluminum alkoxide include the following. (CH₃O)₂AlPh, (C₂H₅O)₂AlPh, (C₃H₇O)₂AlPh, (C₄H₉O)₂AlPh, (CH₃O)AlPh₂, (C₂H₅O)AlPh₂, (C₃H₇O)AlPh₂, (C₄H₉O)AlPh₂.

The allyl-based prepolymer (A) can have a thioether group and/or a halogen atom connected to the main chain thereof. The introduction of a thioether group and/or a halogen atom is conducted by a method where a thiol compound and/or a halogen is added to a polymerization system of an allyl-based monomer, or a method where a thiol compound and/or a halogen are subjected to an addition reaction with the allyl-based prepolymer (A). Examples of the thiol compound used for the introduction of a thioether group include a thiophenol-based compound, such as thiophenol, 2-chlorothiophenol, 4-chlorothiophenol, 4-tert-butylthiophenol and 4-mercaptophenol; dithiol-based compound such as 4,4'-thiodibenzene thiol; aliphatic thiol compound such as n-butylmercaptan and n-laurylmercaptan. Examples of the halogen used for the introduction of an halogen atom include bromine and chlorine.

Examples of each of the homopolymer or copolymer of an allyl-based monomer, the organic-inorganic complex transparent material, and the